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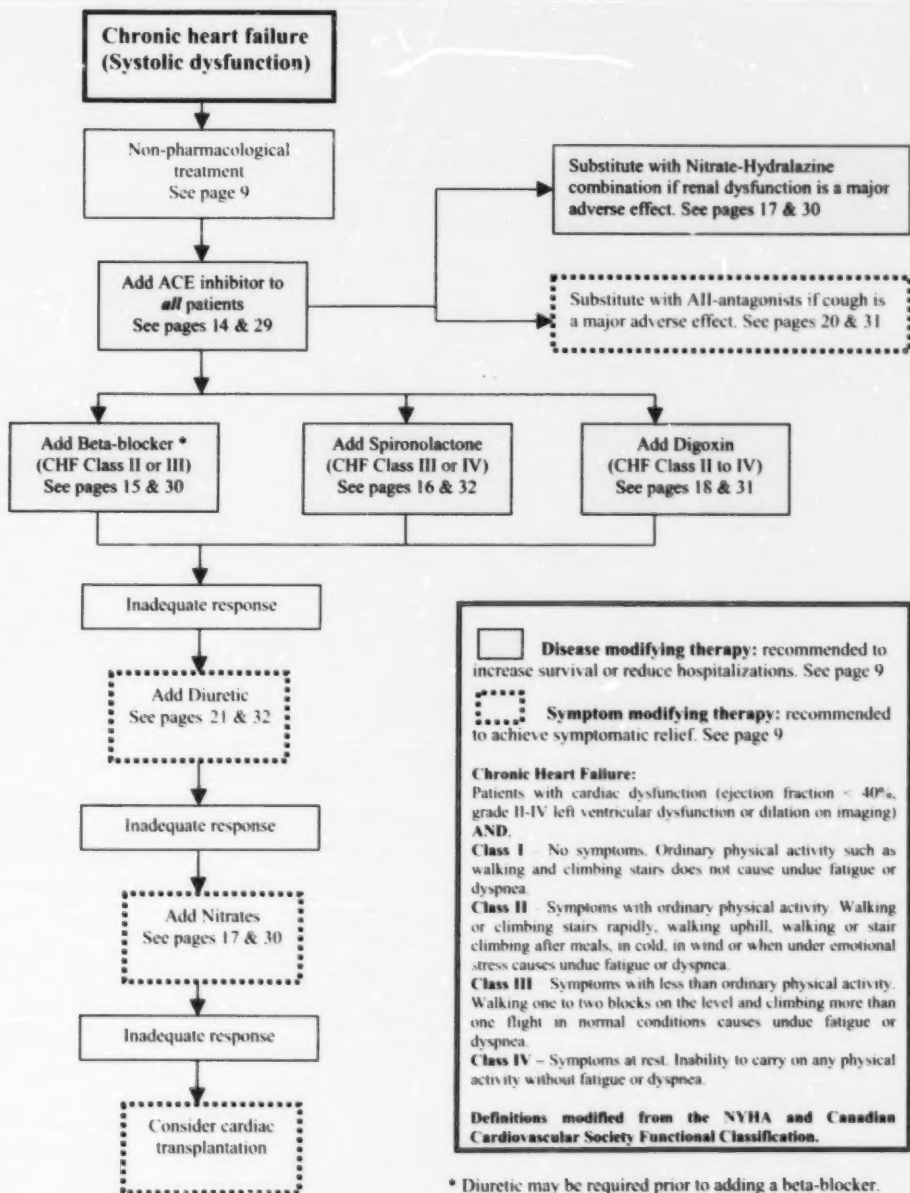
Ontario Drug Therapy Guidelines for Chronic Heart Failure in Primary Care



Ontario Program for Optimal Therapeutics

Guide to the Guideline

Algorithm for using drug therapy for chronic heart failure (CHF)



Ontario Drug Therapy Guidelines for Chronic Heart Failure in Primary Care

Ontario Program for Optimal Therapeutics

June, 2000

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Stakeholder groups were invited to participate in the development of these guidelines by reviewing and commenting upon the guidelines in draft form. These included health care professionals, professional societies, the pharmaceutical industry and the Ontario Ministry of Health and Long-Term Care.

Comments: A form is provided at the end of the document for the submission of reader's suggestions.

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Preamble

Ontario Program for Optimal Therapeutics

Preamble

Purpose

This guideline is intended to assist primary care physicians to use drugs optimally in the management of chronic heart failure, based on the best available evidence.

Guideline development process

The guideline development process combines critical assessment of available research evidence with expert clinical opinion of clinicians and researchers. The process is overseen by a Review Panel consisting of family physicians, relevant specialists, clinical pharmacologists, pharmacists and epidemiologists representing various regions of the province, academic and community-based clinical practice, and research. The process progresses through the following stages:

- Compilation, rigorous review and critical appraisal of evidence sources, including a thorough literature search for relevant trials, meta-analyses, practice guidelines and economic analyses.
- Preparation of a draft of the guidelines, including a grade assigned to each recommendation indicating the strength of its supporting evidence, with drugs designated "first-line" or other based on the strength of efficacy data, adverse effect profile, cost, availability, convenience and other factors.
- Review and comment by a broad spectrum of external stakeholders, including all relevant health care professionals, professional societies, pharmaceutical companies, the Ministry of Health and Long-Term Care, and consumers.
- Progressive refinement of the guidelines, and formulation in final form for publication, by the Review Panel, based on their assessment of the evidence and input from the stakeholder review.

Further details of the process used to develop this consensus guideline can be obtained by contacting OPOT at the following address:

Ontario Program for Optimal Therapeutics
708-25 Charlton Ave E
Hamilton, ON, L8N 1Y2

Cost of drugs

These are based on the prices stated in the Ontario drug benefit formulary / comparative price index, no. 36 (1999) and a survey of retail pharmacy wholesale acquisition costs.

Grading of Recommendations

The following scheme has been used to grade the strength of the recommendations made within the document.

Grade A: Strong recommendation. The recommendation is based primarily upon well-designed randomized controlled trials (RCT's) or meta-analyses that use clinically important outcomes.

Grade B: Moderate recommendation. The recommendation is a combination of high quality evidence and expert opinion.

Grade C: Weak recommendation. The recommendation is based principally upon expert opinion.

Acknowledgements

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Consensus panel

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The views expressed in this document may not be representative of the views held by some of the individual participants, nor the institutions or organizations that they are affiliated with. Preparation of these guidelines was completed March, 2000.



Section I

Introduction

Introduction

Background

Chronic heart failure is a disease with a major impact on morbidity and mortality in Western society. It accounts for approximately 8.6% of deaths either as a primary (3.2%) or secondary diagnosis (5.4%) in Canada.¹ Data indicate a dramatic increase in the incidence and prevalence of chronic heart failure with an increase in age.^{2,3}

Without adequate modern treatment, heart failure remains uniformly lethal with a median survival time of 1.7 years in men and 3.2 years in women and a 5 year survival rate of 25% in men and 38% in women.² The economic consequences of chronic heart failure are presumed to be considerable.

The pharmacotherapy of chronic heart failure has undergone significant changes in the last few years. **ACE inhibitors, beta-blockers and the drug spironolactone have demonstrated mortality benefits in large scale randomized controlled trials.**

Definitions

Heart failure: The inability to pump an adequate volume of blood and/or to do so only from an abnormally elevated filling pressure.⁴

- a) **Systolic dysfunction:** A reduction in the cardiac ejection fraction due to myocardial cell injury or cell death.⁴
- b) **Diastolic dysfunction:** The presence of heart failure with preserved systolic function.

Etiology

The principal determinants of chronic heart failure are ischemic heart disease in conjunction with advancing age.⁵ About 60 to 70 % of adult patients with heart failure have severe left ventricular dysfunction secondary to ischemic heart disease. Hypertension increases the risk of chronic heart failure threefold and is related to the severity of hypertension. ECG left ventricular hypertrophy increases the risk of chronic heart failure. Diabetes mellitus increases the risk two to seven fold, with a greater impact in women than in men.⁶

Clinical findings in chronic heart failure ⁶

History: Fatigue, dyspnea, peripheral edema, orthopnea, paroxysmal nocturnal dyspnea, cough, weight gain, abdominal discomfort and cool extremities.

Physical findings: Tachycardia, low to normal blood pressure, cool peripheral extremities, edema and cyanosis. On respiratory examination, rales, wheezing, pleural effusions and tachypnea may be present.

Non-pharmacological treatment ⁶

- ◆ The goals of therapy are to reduce symptoms, decrease the need for repeat hospitalizations and improve survival.
- ◆ All patients with chronic heart failure should be advised to limit sodium content in their diet. No added table salt should be standard, with subsequent salt restriction guided by the severity of heart failure and response to standard therapy.
- ◆ Patients should be advised to weigh themselves regularly in order to detect any weight gain.
- ◆ Patients and family members should be counseled regarding the following: an understanding of the disease; early recognition of symptoms and signs of heart failure; the need for compliance with medication; and the advisability of light regular activity up to, but short of, producing symptoms.

Therapeutic options

There are two types of drugs that are recommended for use in the management of chronic heart failure.

Disease modifying drugs are able to modify the course of the disease with respect to mortality or hospitalization. Drugs belonging to this group are *angiotensin converting enzyme inhibitors (ACEI's), beta-blockers, spironolactone, the combination of hydralazine and nitrates, and cardiac glycosides.*

Symptom modifying drugs can improve the symptoms but do not necessarily change the long-term course of the disease. Drugs belonging to this group are *diuretics (thiazide and loop classes) and angiotensin II antagonists.*

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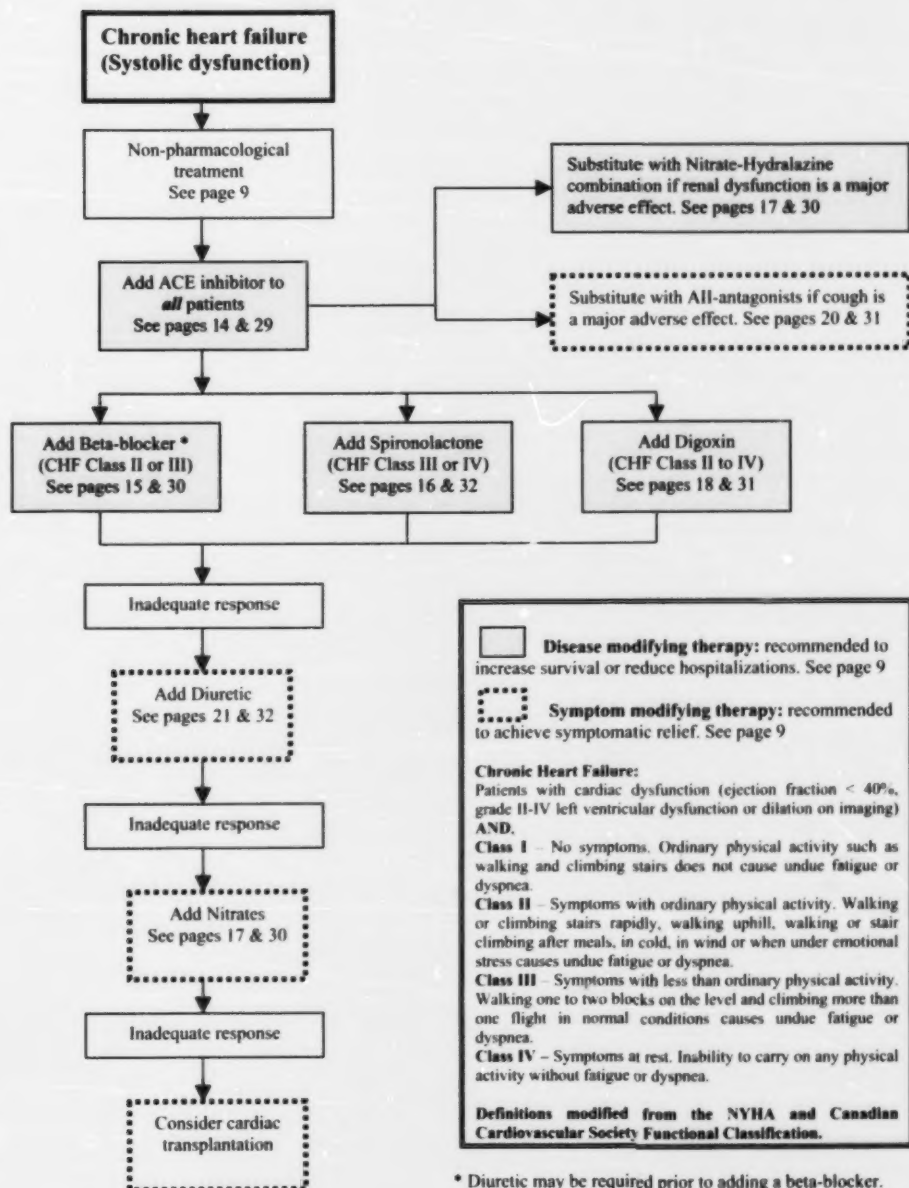
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Algorithm for using drug therapy for chronic heart failure (CHF)



* Diuretic may be required prior to adding a beta-blocker.

Table of therapeutic options

CHF class	Therapeutic options						
	ACEI	Beta-blockers	Spironolactone	Vasodilators	Cardiac glycosides	Angiotensin II antagonists	Diuretics
Patients with cardiac dysfunction (ejection fraction < 40%, grade I-IV left ventricular dysfunction or dilation on imaging) AND: Class I No symptoms. Ordinary physical activity such as walking and climbing stairs does not cause undue fatigue or dyspnea. Class II Symptoms with ordinary physical activity. Walking or climbing stairs rapidly, walking uphill, walking or stair climbing after meals, in cold, in wind or when under emotional stress causes undue fatigue or dyspnea. Class III Symptoms with less than ordinary physical activity. Walking one to two blocks on the level and climbing more than one flight in normal conditions causes undue fatigue or dyspnea. Class IV Symptoms at rest. Inability to carry on any physical activity without fatigue or dyspnea.	Page 14 DM DM DM DM DM	Page 15 DM DM DM DM DM	Page 16 DM DM DM DM DM	Page 17 DM DM DM DM DM	Page 18 DM DM DM DM DM	Page 20 SM SM SM SM SM	Page 21 SM SM SM SM SM
Preserved systolic function (diastolic dysfunction)	Page 23						

Evidence based indications (see page 9 for details) - DM: Disease Modifying SM: Symptom Modifying

Algorithm for using drug therapy for chronic heart failure (CHF)

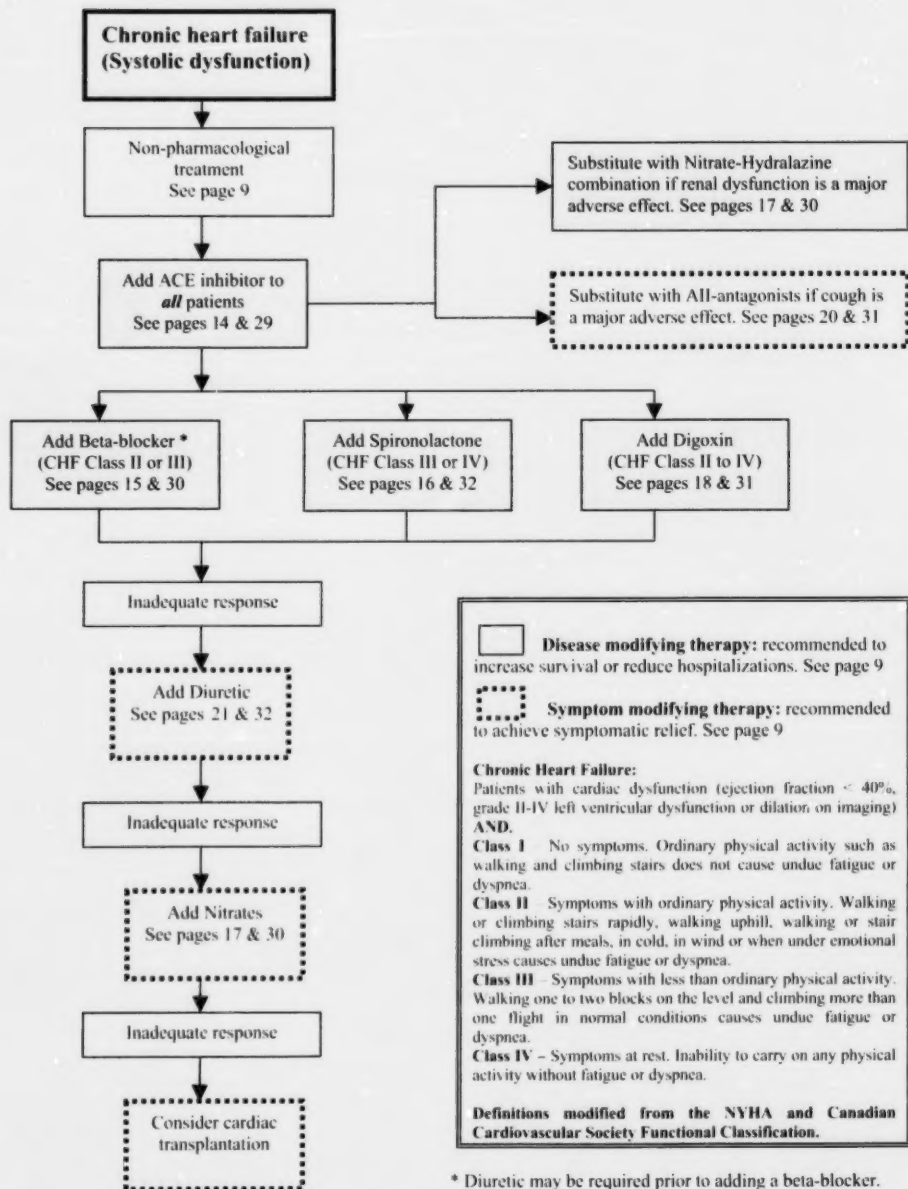


Table of therapeutic options

CHF class	Therapeutic options						
	ACEI	Beta-blockers	Spirinolactone	Vasodilators	Cardiac glycosides	Angiotensin II antagonists	Diuretics
Patients with cardiac dysfunction (ejection fraction < 40%, grade II-IV left ventricular dysfunction or dilation on imaging) AND: Class I No symptoms. Ordinary physical activity such as walking and climbing stairs does not cause undue fatigue or dyspnea. Class II Symptoms with ordinary physical activity. Walking or climbing stairs rapidly, walking uphill, walking or stair climbing after meals, in cold, in wind or when under emotional stress causes undue fatigue or dyspnea. Class III Symptoms with less than ordinary physical activity. Walking one to two blocks on the level and climbing more than one flight in normal conditions causes undue fatigue or dyspnea. Class IV Symptoms at rest. Inability to carry on any physical activity without fatigue or dyspnea.	Page 14	Page 15	Page 16	Page 17	Page 18	Page 20	Page 21
	DM					SM	
	DM	DM		DM	DM	SM	SM
	DM	DM	DM	DM	DM	SM	SM
Preserved systolic function (diastolic dysfunction)	DM		DM	DM	DM	SM	SM
Page 23							

Evidence based indications (see page 9 for details) - DM: Disease Modifying SM: Symptom Modifying

Classification of chronic heart failure

Chronic heart failure

Patients with cardiac dysfunction (ejection fraction < 40%, grade II-IV left ventricular dysfunction or dilation on imaging) AND,

Class I

No symptoms. Ordinary physical activity such as walking and climbing stairs does not cause undue fatigue or dyspnea.

Class II

Symptoms with ordinary physical activity. Walking or climbing stairs rapidly, walking uphill, walking or stair climbing after meals, in cold, in wind or when under emotional stress causes undue fatigue or dyspnea.

Class III

Symptoms with less than ordinary physical activity. Walking one to two blocks on the level and climbing more than one flight in normal conditions causes undue fatigue or dyspnea.

Class IV

Symptoms at rest. Inability to carry on any physical activity without fatigue or dyspnea.

Modified from the NYHA and Canadian Cardiovascular Society Functional Classification.⁴

Section II

Disease Modifying Therapy

Disease modifying therapy

ACE inhibitors⁶⁻¹⁰ (See page 29)

Class I-IV

Recommendation:

- ◆ ACEI's are recommended in all patients as a first line therapy to manage signs and symptoms and improve prognosis.
- ◆ The dose of ACEI's should be increased until the optimal dose is reached, if tolerated.

Grade of Recommendation – A (Strong recommendation)

Beta-blockers^{7,11-16} (See page 30)

Class I

Recommendation:

- ◆ These drugs should not ordinarily be stopped in patients already using them.
- ◆ Adding beta-blocker therapy is appropriate for patients with a recent myocardial infarction.

Grade of Recommendation – B (Moderate recommendation)

Class II-III

Recommendation:

- ◆ Beta-blockers should be administered to stable patients in the presence of ACEI's (and diuretics) unless there are contraindications.
- ◆ A meta-analysis of beta-blockers has shown that these drugs may have a class effect in improving symptoms and reducing the combined risk of hospitalization and death.
- ◆ Initiate treatment with very low doses and increase every 2 to 4 weeks.
- ◆ Chronic heart failure symptoms can worsen initially with beta-blockers but long term prognosis is improved. An increase in diuretic dose may be required.

Grade of Recommendation - A (Strong recommendation)

Class IV

Recommendation:

- ◆ Beta-blockers should not be introduced in class IV patients.
- ◆ Consideration should be given to decreasing the dose by half in patients already receiving beta-blockers.
- ◆ Stopping the beta-blocker is at the discretion of the physician.

Grade of Recommendation – C (Weak recommendation)

Spironolactone¹⁷ (See page 32)

Class III-IV

Recommendation:

- ◆ Spironolactone is recommended in all patients in these classes to manage signs, symptoms and improve prognosis.
- ◆ The initial dose is 25 mg/day which can be titrated up to 50 mg/day if serum potassium and creatinine concentrations measured at 2, 4 and 8 weeks remain stable. A rise in either should prompt a reduction in the dose.

Grade of Recommendation – A (Strong recommendation)

Vasodilator agents ⁶⁻⁸ (See page 30)

Class II

Recommendation:

- ◆ Treatment with these agents is advised only if there is intolerance to ACEI's (e.g. causing renal failure, hyperkalemia).
- ◆ A minimum 10 hour 'nitrate free' period, which can be achieved in the night, is advised to avoid the development of tolerance.

Grade of Recommendation – A (Strong recommendation)

Note: In class III-IV nitrates can be used alone for symptomatic relief in patients who are on ACEI's. Level of Recommendation – C (Weak recommendation)

Cardiac glycosides ^{6-8, 18-20} (See page 31)

Class II-IV

Recommendation:

- ♦ Cardiac glycosides should be administered in the presence of ACEI's and diuretics unless there are contraindications for their use.
- ♦ Their efficacy to manage symptoms has been proven in patients with sinus rhythm; discontinuation of therapy can precipitate clinical deterioration.
- ♦ Maintain serum trough levels (pre dose levels) between 0.6 –2.6 nmol/L.

Grade of Recommendation - A (Strong recommendation)

Section III

Symptom Modifying Therapy

Symptom modifying therapy

Angiotensin II antagonists^{21,22} (See page 31)

Class I-IV

Recommendation:

- ♦ For use as an alternative to ACEI's, for patients with intolerable cough associated with ACEI's.

Grade of Recommendation – B (Moderate recommendation)

Diuretics ^{6-8, 17,23,24} (See page 32)

Class II

Recommendation:

- ◆ Diuretics are indicated in the presence of fluid retention in the form of peripheral edema or lung congestion. It is recommended that the drugs be administered during the day so as to limit nocturia.
- ◆ Loop diuretics should be used as first line agents and thiazides may be added in cases where there is a failure to respond to loop diuretics.
- ◆ The lowest dose of diuretic should be used to allow the achievement of optimal dose of ACEI's, e.g. in symptomatic hypotension the diuretic should be decreased.
- ◆ Measurement of serum potassium and creatinine levels at 1, 4 and 8 weeks after initiation of therapy is suggested.

Grade of Recommendation – B (Moderate recommendation)

Class III-IV

Recommendation:

- ◆ Diuretics are indicated in the presence of fluid retention in the form of peripheral edema or lung congestion. It is recommended that the drugs be administered during the day so as to limit nocturia.
- ◆ Loop diuretics should be used as first line agents. A thiazide diuretic may be added when there is failure to respond to a loop diuretic.
- ◆ Bumetanide should be restricted to patients not responding to a maximum dose (240 mg furosemide) of a furosemide-thiazide combination. Bumetanide may also demonstrate less impairment of glucose intolerance than furosemide.
- ◆ The lowest dose of diuretic should be used so as to allow the achievement of optimal dose of ACEI's. E.g. in symptomatic hypotension, the diuretic should be decreased.
- ◆ Measurement of serum potassium and creatinine levels at 1, 4 and 8 weeks after initiation of therapy is suggested.

Grade of Recommendation – B (Moderate recommendation)

Calcium channel blockers ⁷

Class I-IV

Recommendation:

- ◆ Not recommended as part of the management of chronic heart failure.
- ◆ CCB's do not have to be stopped if being used for angina in situations where beta-blockers and nitrates have failed, but the dose may have to be reduced to allow optimal dosing of ACEI's.
- ◆ Switching CCB to ACEI may be considered.

Grade of Recommendation – C (Weak recommendation)

Section IV

Preserved Systolic Function (Diastolic Dysfunction Therapy)



Congestive heart failure with preserved systolic function (also known as diastolic dysfunction)

Etiologies ⁶

1. Past history of hypertension and evidence of myocardial hypertrophy.
2. Significant coronary artery disease.
3. Hypertrophic cardiomyopathy.

Diagnosis ⁶

In the presence of normal left ventricular function on imaging, the findings of pulmonary or systemic congestion in the absence of cardiomegaly (e.g. less than expected displacement of the apex beat) may support a suspicion of predominant diastolic dysfunction. Alternatively, it is important to identify either constrictive pericarditis or mitral stenosis, as they are surgically treatable conditions.

Recommendation:

- ◆ Treatment of the underlying condition (e.g. hypertension, ischemic heart disease or valvular heart disease).
- ◆ Preferred drug therapies are ones that decrease plasma volume (diuretics), are negative inotropes (beta-blockers, rate limiting calcium channel blockers) or are negative chronotropes (beta-blockers, rate limiting calcium channel blockers).

Grade of Recommendation - C (Weak recommendation)



Section V

Drug Dosages and Costs



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Section V: Drug Dosages and Costs

Drug dosages and costs

ACE inhibitors

Note:

The drugs in this class can be divided into two groups based on the availability of evidence in the treatment of this condition.

Group A- ACEI's that have been extensively studied in the treatment of chronic heart failure with respect to mortality.

Group B- ACEI's that have not been extensively studied in the treatment of chronic heart failure with respect to mortality.

Name	Dose	Daily cost of optimal dose (\$)
Group A		
Captopril	6.25 mg - 50 mg t.i.d. (optimal dose: 50 mg t.i.d)	1.68
Enalapril	2.5 mg o.d - 20 mg b.i.d (optimal dose: 10 - 20 mg b.i.d)	1.92 - 2.32
Lisinopril	2.5 mg - 30 mg o.d (optimal dose: 30 mg o.d)	1.78
Ramipril*	2.5 mg o.d - 10 mg o.d. (optimal dose: 10 mg o.d)	0.95
Trandolapril	1 mg - 4 mg o.d (optimal dose: 4 mg o.d)	1.54
Group B		
Benazepril	10 mg - 40 mg o.d (optimal dose: 40 mg o.d)	1.56
Cilazapril	0.5 mg - 5 mg o.d (optimal dose: 5 mg o.d)	0.79
Fosinopril	5 mg o.d - 40 mg o.d (optimal dose: 40 mg o.d)	1.90
Perindopril	4 mg - 8 mg o.d (optimal dose: 8 mg o.d)	1.50
Quinapril	10 mg - 40 mg o.d (optimal dose: 40 mg o.d)	0.82

* Extrapolated from trial data using 5 mg b.i.d

See appendix A for common brand names in this class.



Section V: Drug Dosages and Costs

Drug dosages and costs

ACE inhibitors

Note:

The drugs in this class can be divided into two groups based on the availability of evidence in the treatment of this condition.

Group A- ACEI's that have been extensively studied in the treatment of chronic heart failure with respect to mortality.

Group B- ACEI's that have not been extensively studied in the treatment of chronic heart failure with respect to mortality.

Name	Dose	Daily cost of optimal dose (\$)
Group A		
Captopril	6.25 mg - 50 mg t.i.d. (optimal dose: 50 mg t.i.d.)	1.68
Enalapril	2.5 mg o.d - 20 mg b.i.d. (optimal dose: 10 - 20 mg b.i.d.)	1.92 - 2.32
Lisinopril	2.5 mg - 30 mg o.d. (optimal dose: 30 mg o.d.)	1.78
Ramipril*	2.5 mg o.d - 10 mg o.d. (optimal dose: 10 mg o.d.)	0.95
Trandolapril	1 mg - 4 mg o.d. (optimal dose: 4 mg o.d.)	1.54
Group B		
Benazepril	10 mg - 40 mg o.d. (optimal dose: 40 mg o.d.)	1.56
Cilazapril	0.5 mg - 5 mg o.d. (optimal dose: 5 mg o.d.)	0.79
Fosinopril	5 mg o.d - 40 mg o.d. (optimal dose: 40 mg o.d.)	1.90
Perindopril	4 mg - 8 mg o.d. (optimal dose: 8 mg o.d.)	1.50
Quinspril	10 mg - 40 mg o.d. (optimal dose: 40 mg o.d.)	0.82

* Extrapolated from trial data using 5 mg b.i.d.

See appendix A for common brand names in this class.

Beta-blockers

Name	Dose	Daily cost of optimal dose (\$)
Carvedilol	6.25 mg b.i.d ; increase slowly over 2 to 10 weeks to an optimal dose of 25 to 50 mg b.i.d.	2.54 – 5.08
Metoprolol	12.5 mg b.i.d; increase slowly over a period of 7 weeks to an optimal dose of 75 mg b.i.d .	0.37

See appendix A for common brand names in this class.

Vasodilator agents

Name	Dose	Daily cost of optimal dose (\$)
Combination of Isosorbide dinitrate [†]	5 mg - 40 mg q.i.d (optimal dose: 40 mg q.i.d)	0.19
AND Hydralazine	10 mg - 75 mg q.i.d (optimal dose: 75 mg q.i.d)	1.67
Nitrates (only)*	Isosorbide dinitrate- 30 mg o.d or Nitroglycerine patch- 0.4 –0.8mg/hr o.d (max 0.8 mg/hr 12 hr.)	0.03 0.64 – 1.28

[†] Although a minimum 10 hour 'nitrate free' period, which can be achieved in the night, is advised to avoid the development of tolerance, the clinical trial demonstrating efficacy in the treatment of heart failure used q.i.d dosing.

* For symptom relief in conjunction with ACEI's.

See appendix A for common brand names in this class.

Cardiac glycosides

Name	Dose	Daily cost (\$)
Digoxin	0.125 mg – 0.25 mg once daily	0.09

See appendix A for common brand names in this class.

Angiotensin II antagonistsNote:

The drugs in this class can be divided into two groups based on the availability of evidence in the treatment of this condition.

Group A- A-II antagonists that have been extensively studied in the symptomatic treatment of chronic heart failure.

Group B- A-II antagonists that have not been extensively studied in the symptomatic treatment of chronic heart failure.

Name	Dose	Daily cost of optimal dose (\$)
Group A		
Candesartan	8 mg o.d – 16 mg o.d (optimal dose: 16 mg o.d)	1.08
Losartan	50 mg – 100 mg o.d (optimal dose: 100 mg o.d)	1.10
Group B		
Irbesartan	150 mg o.d – 300 mg o.d (optimal dose: 300 mg o.d)	1.08
Telmisartan	80 mg o.d (optimal dose: 80 mg o.d)	1.25
Valsartan	80 mg o.d – 160 mg o.d (optimal dose: 160 mg o.d)	1.05

See appendix A for common brand names in this class.

Beta-blockers

Name	Dose	Daily cost of optimal dose (\$)
Carvedilol	6.25 mg b.i.d. ; increase slowly over 2 to 10 weeks to an optimal dose of 25 to 50 mg b.i.d.	2.54 – 5.08
Metoprolol	12.5 mg b.i.d.; increase slowly over a period of 7 weeks to an optimal dose of 75 mg b.i.d.	0.37

See appendix A for common brand names in this class.

Vasodilator agents

Name	Dose	Daily cost of optimal dose (\$)
Combination of Isosorbide dinitrate [†]	5 mg - 40 mg q.i.d (optimal dose: 40 mg q.i.d)	0.19
AND Hydralazine	10 mg - 75 mg q.i.d (optimal dose: 75 mg q.i.d)	1.67
Nitrates (only)*	Isosorbide dinitrate- 30 mg o.d or Nitroglycerine patch- 0.4 – 0.8mg hr o.d (max 0.8 mg hr 12 hr.)	0.03 0.64 – 1.28

[†] Although a minimum 10 hour 'nitrate free' period, which can be achieved in the night, is advised to avoid the development of tolerance, the clinical trial demonstrating efficacy in the treatment of heart failure used q.i.d dosing.

* For symptom relief in conjunction with ACEFs.

See appendix A for common brand names in this class.

Cardiac glycosides

Name	Dose	Daily cost (\$)
Digoxin	0.125 mg – 0.25 mg once daily	0.09

See appendix A for common brand names in this class.

Angiotensin II antagonists*Note:*

The drugs in this class can be divided into two groups based on the availability of evidence in the treatment of this condition.

Group A- A-II antagonists that have been extensively studied in the symptomatic treatment of chronic heart failure.

Group B- A-II antagonists that have not been extensively studied in the symptomatic treatment of chronic heart failure.

Name	Dose	Daily cost of optimal dose (\$)
Group A		
Candesartan	8 mg o.d – 16 mg o.d (optimal dose: 16 mg o.d)	1.08
Losartan	50 mg – 100 mg o.d (optimal dose: 100 mg o.d)	1.10
Group B		
Irbesartan	150 mg o.d – 300 mg o.d (optimal dose: 300 mg o.d)	1.08
Telmisartan	80 mg o.d (optimal dose: 80 mg o.d)	1.25
Valsartan	80 mg o.d – 160 mg o.d (optimal dose: 160 mg o.d)	1.05

See appendix A for common brand names in this class.

Section V: Drug Dosages and Costs

Diuretics

Class / Name	Dose	Daily cost (\$)
Loop diuretics		
Bumetanide	1 mg - 5 mg o.d	0.48 - 1.85
Furosemide	20 mg o.d - 120 mg b.i.d	0.01 - 0.07
Thiazides		
Chlorthalidone	25 mg - 50 mg o.d	0.01 - 0.02
Hydrochlorothiazide	12.5 mg - 50 mg o.d	0.01
Metolazone	2.5 mg - 10 mg o.d	0.15 - 0.24
Potassium sparing diuretics		
Spironolactone	25 mg - 50 mg o.d	0.07 - 0.14

See appendix A for common brand names in this class.

Diuretics

Class / Name	Dose	Daily cost (\$)
Loop diuretics		
Bumetanide	1 mg – 5 mg o.d	0.48 – 1.85
Furosemide	20 mg o.d – 120 mg b.i.d	0.01 – 0.07
Thiazides		
Chlorthalidone	25 mg - 50 mg o.d	0.01 – 0.02
Hydrochlorothiazide	12.5 mg – 50 mg o.d	0.01
Metolazone	2.5 mg - 10 mg o.d	0.15 – 0.24
Potassium sparing diuretics		
Spironolactone	25 mg – 50 mg o.d	0.07 – 0.14

See appendix A for common brand names in this class.

Reference List



Reference List

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Appendices



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Brand Names Corresponding to Generic Drug Names

ACE inhibitors

Generic name	Trade name
Group A	
Captopril	<i>Apo-Capto, Capoten, Capril, Gen-Captopril, Novo-Captopril, Nu-Capto, PMS-Captopril</i>
Enalapril	<i>Vasotec</i>
Lisinopril	<i>Apo-Lisinopril, Prinivil, Zestril</i>
Ramipril	<i>Altace</i>
Trandolapril	<i>Mavik</i>
Group B	
Benazepril	<i>Lotensin</i>
Cilazapril	<i>Inhibace</i>
Fosinopril	<i>Monopril</i>
Perindopril	<i>Coversyl</i>
Quinapril	<i>Accupril</i>

Beta-blockers

Generic name	Trade name
Carvedilol	<i>Coreg</i>
Metoprolol	<i>Apo-Metoprolol, Apometoprolol (Type L), Betaloc, Betaloc Durules, Lopressor, Novo-Metoprolol, Nu Metop, PMS-Metoprolol-B, PMS-Metoprolol-L</i>

Vasodilator agents

Generic name	Trade name
ISDN SF	<i>Apo-ISDN, Isordil</i>
ISDN SR	<i>Cedocard SR</i>
Hydralazine	<i>Apresoline, Apo-Hydralazine, Novo-Hyzalin</i>
Other nitrate preparations	
Nitroglycerin (tab)	<i>Nitrostat</i>
Nitroglycerin (Ointment)	<i>Nitrol</i>
Nitroglycerin (patch)	<i>Trinipatch, Nitro-Dur, Minitran</i>
Nitroglycerin (tab) SR	<i>Nitrong SR</i>
Nitroglycerin (spray)	<i>Nitrolingual spray, Nitrolingual pumpspray</i>
IS-5-MN	<i>Ismo</i>
IS-5-MN SR	<i>Imdur</i>



Appendices

Brand Names Corresponding to Generic Drug Names

ACE inhibitors

Generic name	Trade name
Group A	
Captopril	<i>Apo-Capto, Capoten, Capril, Gen-Captopril, Novo-Captopril, Nu-Capto, PMS-Captopril</i>
Enalapril	<i>Vasotec</i>
Lisinopril	<i>Apo-Lisinopril, Prinivil, Zestril</i>
Ramipril	<i>Altace</i>
Trandolapril	<i>Mavik</i>
Group B	
Benazepril	<i>Lotensin</i>
Cilazapril	<i>Inhibace</i>
Fosinopril	<i>Monopril</i>
Perindopril	<i>Coversyl</i>
Quinapril	<i>Accupril</i>

Beta-blockers

Generic name	Trade name
Carvedilol	<i>Coreg</i>
Metoprolol	<i>Apo-Metoprolol, Apometoprolol (Type L), Betaloc, Betaloc Durules, Lopressor, Novo-Metoprolol, Nu Metop, PMS-Metoprolol-B, PMS-Metoprolol-L</i>

Vasodilator agents

Generic name	Trade name
ISDN SF	<i>Apo-ISDN, Isordil</i>
ISDN SR	<i>Cedocard SR</i>
Hydralazine	<i>Apresoline, Apo-Hydralazine, Novo-Hyzalin</i>
Other nitrate preparations	
Nitroglycerin (tab)	<i>Nitrostat</i>
Nitroglycerin (Ointment)	<i>Nitrol</i>
Nitroglycerin (patch)	<i>Trinipatch, Nitro-Dur, Minitran</i>
Nitroglycerin (tab) SR	<i>Nitrong SR</i>
Nitroglycerin (spray)	<i>Nitrolingual spray, Nitrolingual pumpspray</i>
IS-5-MN	<i>Ismo</i>
IS-5-MN SR	<i>Imdur</i>

Appendices

Cardiac glycosides

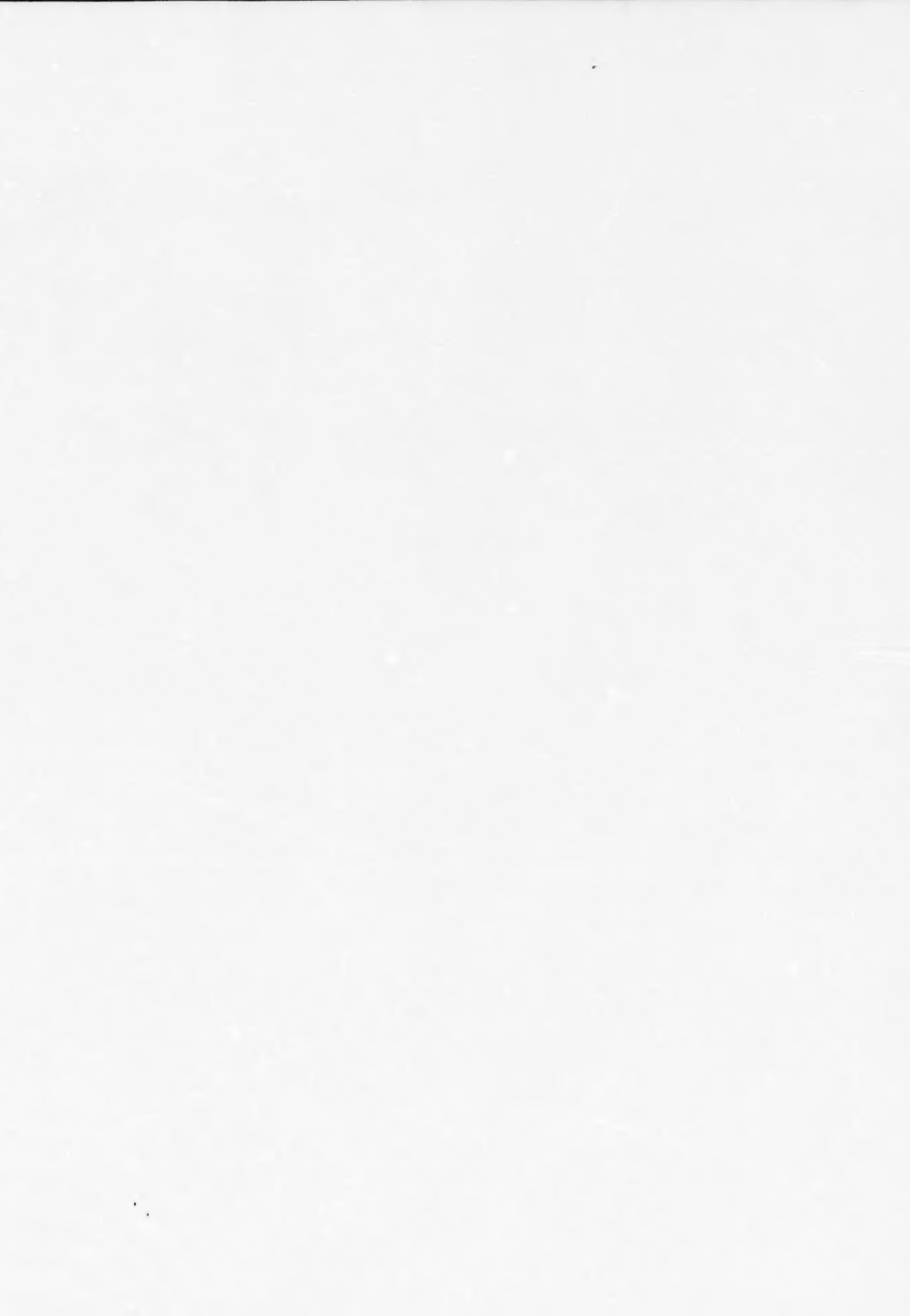
Generic name	Trade name
Digoxin	<i>Lanoxin</i>

Angiotensin II antagonists

Generic name	Trade name
Group A	
Candesartan	<i>Atacand</i>
Losartan	<i>Cozaar</i>
Group B	
Irbesartan	<i>Avapro</i>
Telmisartan	<i>Micardis</i>
Valsartan	<i>Diovan</i>

Diuretics

Generic name	Trade name
Loop diuretics	
Bumetanide	<i>Burinex</i>
Furosemide	<i>Apo-Furosemide, Novo-Furosemide, Lasix</i>
Thiazides	
Chlorthalidone	<i>Apo-Chlorthalidone, Novo-Thalidone, Hygroton</i>
Hydrochlorothiazide	<i>Apo-Hydro 25, Novo-Hydrazide, Hydrochlorothiazide, HydroDIURIL</i>
Metolazone	<i>Zaroxolyn</i>
Potassium sparing diuretics	
Spironolactone	<i>Aldactone, Novo-Spiroton</i>



Cardiac glycosides

Generic name	Trade name
Digoxin	<i>Lanoxin</i>

Angiotensin II antagonists

Generic name	Trade name
Group A	
Candesartan	<i>Atacand</i>
Losartan	<i>Cozaar</i>
Group B	
Irbesartan	<i>Avapro</i>
Telmisartan	<i>Micardis</i>
Valsartan	<i>Diovan</i>

Diuretics

Generic name	Trade name
Loop diuretics	
Bumetanide	<i>Burinex</i>
Furosemide	<i>Apo-Furosemide, Novo-Furosemide, Lasix</i>
Thiazides	
Chlorthalidone	<i>Apo-Chlorthalidone, Novo-Thalidone, Hygroton</i>
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